

## The paper test

You can do a test to determine whether or not the enzymes you have bought are capable of breaking down the cell walls of dead plant cells. You can do this test using commonplace materials; you will only need beakers (cups) and a piece of paper. It is preferable to use thin, white paper. A writing pad is perfect but you can also use a 'post it' note or printer paper. Newspaper and brown coffee filter paper are not suitable and tissue paper is too thin.



This is what you need.



Put a tablespoonful of water in a beaker.



Put a tablespoonful of the enzyme product in a second beaker.



Label the beakers to show their contents.



Cut two pieces out of the paper.



Put a piece of paper in each beaker and ensure that they are under the surface of the liquid. Put the beakers aside.



Agitate the beakers after a day.



The product is capable of breaking down cell walls if the piece of paper completely disintegrates like a sugar cube.

### The scientific basis for the paper test

Paper is made up of cellulose. The cell walls of plants are also mostly made up of cellulose. In other words, if paper can be broken down by the enzyme product it can also break down cell walls to a large extent.

The beaker that contains water is used to show that water doesn't cause the paper to disintegrate. If the paper fails to disintegrate in the enzyme product very well, it may be that the paper is a little too thick. Try again with different paper using a piece from the copier for example.



## The apple sauce experiment

Luckily, you don't need a microscope to find out if your enzyme product can separate cells. You can probably find what you need in the kitchen: a funnel (if you don't have one you could possibly use the funnel from the coffee machine), a coffee filter, a jar of apple sauce, a tablespoon and some beakers (if you use throw away, plastic beakers (cups) you can make a note of the contents on the beakers themselves). Follow the sequence for working that is given below exactly!



This is what you need.



If you use throw away, plastic beakers (cups) you can make a note of the contents on the beakers themselves. Doing this will ensure that you don't confuse the beakers later.



Put a tablespoonful of apple sauce in each of the beakers. They don't have to be exact tablespoonfuls but they should both be about the same amount.



Rinse the spoon well under the tap and add a tablespoonful of the enzyme product to one of the beakers.



Carefully stir the contents of the beaker well and rinse the spoon thoroughly once more.



Add a tablespoonful of water to the other beaker and stir it again. Let the beakers stand for two hours (not in the fridge).



Pour the apple sauce from the beaker to which you added the water into the funnel with a filter in it having put a labelled beaker underneath. Wait an hour then look to see how much liquid has passed through the filter. Measure the liquid recovered in the beaker. Change the filter and repeat the process with the beaker containing enzyme.



The 'water beaker' is this full.



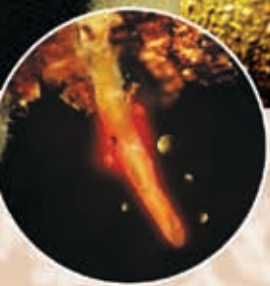
This is how the enzyme beaker looks if your enzyme product can separate cells: full of juice. If it looks the same as the water beaker then it either doesn't work or works badly.

### The scientific basis for the apple sauce experiment.

Apple sauce consists of both juice and clusters of cells. When these cells are separated from each other the apple sauce becomes thinner and there will be more juice.

This is why more juice is collected when using enzymes than when using plain water.

# ENZYME TEST DIY



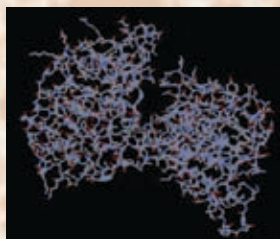
## Which enzyme products do work?

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During their life, plants are continuously making new roots and roots are constantly dying off. This process of dying off doesn't just form a source of infection for diseases; valuable space is taken up by the dead roots instead of air. Enzyme products are used to break down these dead root cells. In addition to creating more air space, the plant can also absorb the nutrients that are released. An additional advantage is that the substrate currently in use for cultivation can be used again. These enzyme products have additional properties as well.



**What are the enzymes and how do they work exactly?**



Enzymes seem to be a type of intangible substance that can only be detected with the use of the correct laboratory equipment. This leaflet explains how you can detect enzymes yourself, simply and at home, so that you can determine whether or not your product contains the correct enzymes.

### WHAT ARE ENZYMES?

Enzymes are proteins that have a very special function; they can both build up and break down substances. Each enzyme has a specific function and generally speaking, they can only build up or break down one type of substance. If an enzyme does this, and it is not used up, it can stimulate the same reaction thousands of times. Our world would look very different without enzymes. Enzymes are used in making innumerable products; consider the preparation of bread, cheese or beer for example.



Enzymes that are used in cultivation must in any case be capable of breaking down plant remains. Plant remains are made up of cells that are joined together with a kind of glue. So if you want to break down the remains, the glue between the cells has to be broken down and the cells broken into pieces. A wide range of enzymes are needed for this, two of which are indispensable. The first enzyme dissolves the glue between the cells while the second enzyme breaks the cell walls into pieces. These enzymes are mainly involved in doing the rough work. Other enzymes are needed in addition to these two,

but without these two enzymes an enzyme product simply wouldn't work. If you want to know if these enzymes are present in the product that you use you can perform these simple tests using items that you can buy in the supermarket. You have to carry out two tests to do this. If the results of both tests are good it means that both enzymes are present and that your product is actually capable of breaking down dead plant remains.

### THE TESTS

You don't need a laboratory to know if the brand you have purchased works. You already have everything you need at home or you can buy it at the supermarket. In order to determine whether or not the enzymes you have bought are capable of separating the dead cells (breaking down the glue) we are going to carry out two experiments: the apple sauce experiment and the paper test. Read the text thoroughly before you begin the tests to be sure that you have everything you need and that you know in advance what you are going to do. If you begin both tests on the same day you will know if your product works properly the following day.

